

Rhodora

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HABENARIA ORBICULATA AND H. MACROPHYLLA.

OAKES AMES.

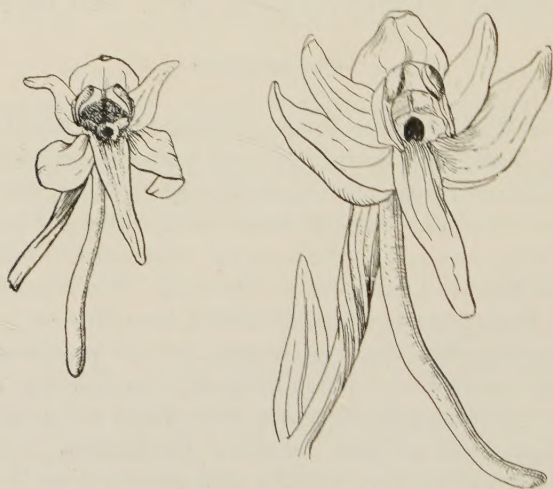
FOR several years I have observed during my studies of *Habenaria orbiculata*, Torr., that the species as at present understood includes two very distinct forms, one characterized by a short, the other by a long, spur. Attention was first drawn to this difference by Mr. J. H. Schuette who sent me a specimen of the short-spurred form collected near Mink River in Door County, Wisconsin. Mr. Schuette regarded the Mink River plant as varietally distinct from *Habenaria orbiculata*, Torr., and requested that a description of it be published. At that time it was impossible to decide which form answered to the original description of *Habenaria orbiculata*, which Pursh had published under Orchis in his Flora of North America. Furthermore it became evident that if Pursh had described the short-spurred form, then the long-spurred form would be the *Habenaria macrophylla* of Goldie that led to an interesting botanical controversy between W. J. Hooker and Dr. John Torrey many years ago, and that was unfortunately relegated to the rank of a synonym under *H. orbiculata*.

H. macrophylla was collected in Canada by Goldie and sent to Hooker with the following note "Orchis — This beautiful plant I found in shady woods Island of Montreal, approaches nearest to *O. orbiculata* of Pursh, of which I have not sent a specimen. However, that is very different —

"This species differs from *O. orbiculata* in being always 3 or 4 times larger, leaves more elliptic &c. in a living state, more thin and lucid, bracteas much shorter. The fl. are large & white — very rare.

"I have only seen a very few plants of it. I have one or two roots

alive." A description of this plant was published in the Edinburgh Philosophical Journal (6: 331, 1822) where the name *Habenaria macrophylla* was given to it. Subsequently in his Exotic Flora, Dr. Hooker published an excellent plate of *Habenaria Hookeri* under the name *H. orbiculata* (Pursh) and in an elaborate note indicated the differences between this plant and Goldie's *H. macrophylla*, prompted to do so, presumably, by a letter which he had received from Dr. Torrey. "It is," he writes, "with much surprise I find that my friend Dr. Torrey of New York, in a letter which he had the goodness to write to me upon the subject of Mr. Goldie's paper, considers the *H.*



Flowers of *Habenaria orbiculata*, Torr. (left) and *H. macrophylla*, Goldie (right), enlarged to the same scale.

macrophylla, of which he judges of course only by the description to be the same with *H. orbiculata* of Pursh, notwithstanding that the differences between these two plants are fully and satisfactorily pointed out in the Memoir in question. It will suffice here to mention, that *H. macrophylla* is twice the size of the present individual in almost all its parts, and that the anther is at each angle at base, prolonged into a projecting horn." About fifteen years later in *Flora Boreali-Americana* (2: 197) Hooker corrected the treatment of the Exotic Flora, and reduced *H. macrophylla* to a synonym of *H. orbiculata* with the following explanation: "This fine species, having been but ill defined by its first describer (Pursh), has been much misunderstood, and the

preceding plant (*H. Hookeri*) was by myself, as well as by other botanists, both in America and in Europe, mistaken for it. From collateral evidence, however, Drs. Torrey and Gray were led to consider the present as the true *orbiculata*; and the correctness of their ideas has been confirmed by the latter botanist, on his recent examination of the original Purshian Herbarium, in Mr. Lambert's possession."

From the preceding remarks it will be clear that *H. macrophylla* was permitted to pass into synonymy because the identity of *H. orbiculata* had been obscured by confusion with *H. Hookeri*, a related but most distinct species, and because a thorough comparison of *H. macrophylla* with the Pursh plants of *H. orbiculata* was not made. That *H. orbiculata* and *H. macrophylla* are distinguishable is in a measure proved by John Lindley's treatment of these species — which he placed under *Platanthera* — in *Genera and Species of Orchidaceous Plants*. On page 286 he brought together three species which seem clearly referable to what for convenience we may designate the *orbiculata* group. These species are *H. Hookeri*, *H. orbiculata* and *Platanthera Menziesii*. Of these we may neglect the first as its identity is unquestionable. The second is characterized in part by having the spur twice longer than the ovary, and in the synonymy which accompanies it we find *H. macrophylla*. The third, collected by Menzies on the west coast of North America — a species which does not appear in our manuals of botany, and which has remained in obscurity — is characterized by having a spur subequal with the ovary. This third species Kränzlin in his *Genera et Species Orchidacearum*, has unwittingly confused with *H. elegans*, Bolander, as to description and as to the Californian plant which he has cited as no. 6252, Bolander.

The inadequacy of Lindley's original description, and Kränzlin's discrepancies made desirable a more intimate knowledge of the type specimen. A photograph obtained at Kew by Dr. Robinson made this possible and proved conclusively that *Platanthera Menziesii* is the short-spurred form of *Habenaria orbiculata*. Subsequently I examined the type and also several sheets of specimens which Menzies had collected, and satisfied myself that the conclusions which I had drawn from a study of the photograph communicated by Dr. Robinson were correct. Lindley, then, on the supposition that the long-spurred form representative of Goldie's *H. macrophylla* was conspecific with the Pursh type of *H. orbiculata*, had considered the short-spurred form a distinct species. Having arrived at this point, it became ab-

solutely essential to know what Pursh had described as *Orchis orbiculata*. According to Pursh's *Flora Americae Septentrionalis*, *Habenaria orbiculata* inhabits the mountains of Pennsylvania and Virginia and blooms in July and August. Our present knowledge of the distribution of the species as far as the short-spurred form is concerned, extends this range to Canada and Alaska in the north, and to Minnesota in the middle west. The long-spurred form is rather rare and as represented in the principal herbaria of the United States does not reach so far south as Pennsylvania and Virginia and does not occur west of Wisconsin. Therefore, the evidence supplied by distribution would make it seem that the Pursh plant must have been characterized by a short spur. According to Pursh's *Journal of a Botanical Excursion in the Northeastern part of the States of Pennsylvania and New York during the Year 1807*, he found a *Habenaria* late in June in Pennsylvania, which he called *Orchis bifolia* because of its resemblance to the European species so called in his time. He gave an elaborate account of it and his description agrees well with the character of *H. orbiculata*, although it does not distinguish his material from the long-spurred form which Goldie called *H. macrophylla*. Unfortunately Pursh's herbarium is no longer intact as it was distributed at the sale of the Lambert collection of which it formed a part; but in my search for an authentic specimen I found at Kew a sheet which I think may be accepted as the type of his *Orchis orbiculata*. It is a sheet from his own herbarium and was presumably acquired for Dr. Hooker at the Lambert sale. The spur, which is 2 cm. long, distinguishes the plant at once from *H. macrophylla*, Goldie, and establishes the identity of *Platanthera Menziesii*, Lindley, which we must regard as conspecific with the Pursh plant.

While on the preceding pages *Habenaria orbiculata* and *H. macrophylla* have been separated by the length of the spur, the two species are readily distinguishable by other differential characters. That the spur length, however, is the most useful diagnostic character cannot be denied. It is not an arbitrary distinction and does not lead to artificial discrimination among specimens, irrespective of distribution and habitat. The diagnostic value of the spur is clearly shown by the following tabulation of length-frequencies.¹

¹The spurs of *Platanthera Menziesii* are not included in the measurements as Lindley's type and the British Museum specimens collected by Menzies are not fully developed.

H. orbiculata.

Length (mm.)	16	17	18	19	20	21	22	23	24	25	26	27	28	29
No. of cases observed,	2	2	7	7	9	4	1	2	1	3	2	1	0	0

H. macrophylla.

Length (mm.)	30	31	32	33	34	35	36	37	38	39	40	41	42	43
No. obs.	0	0	1	0	1	6	3	7	2	1	2	0	1	1

These figures illustrate the fact that in *Habenaria orbiculata* Torr. the most frequent spur-length is about 2 cm. and that in *H. macrophylla*, Goldie, the most frequent length is 3.5–3.7 cm. The flowers of *H. orbiculata* are considerably smaller than those of *H. macrophylla*, as is shown by the accompanying text cuts. The following shows what seems to be the most satisfactory treatment of the species herein considered.

HABENARIA ORBICULATA, Torrey, Compendium, 318 (1826).—*Orchis orbiculata*, Pursh. Fl. Am. 2: 588 (1814).—*Platanthera Menziesii*, Lindley, Orch. Pl. 286 (1835).—*Lysias orbiculata*, Rydberg, Britton's Manual 294, in part.—Spur 1.6–2.7 cm. long. South Carolina, Tennessee, Maine, westward to Minnesota and Washington, and northward.

HABENARIA MACROPHYLLA, Goldie, Edinb. Phil. Journ. 6: 331 (1822).—*Platanthera orbiculata*, Lindley, Orch. Pl. 286 (1835).—*H. orbiculata*, Britton and Brown, Ill. Fl. 1: 461 (excl. fig.).—*Lysias orbiculata*, Rydberg, Britton's Manual 294, in part.—Spur 3.2–4.3 cm. long. Connecticut to Wisconsin and northward.

NORTH EASTON, MASSACHUSETTS.

HYBRIDISM IN THE GENUS VIOLA,— II.

EZRA BRAINERD.

THE discussion of this subject, commenced over a year ago,¹ I purpose to resume in this and a subsequent paper. During the past year the problem has been studied persistently; most of the known aberrant forms of northeastern America have been grown in the garden; and several journeys through the coastal region of the Middle and New England States have been made to observe anomalous plants in their natural surroundings. I take pleasure in saying that in all this investigation I have been greatly assisted by the kindness of numerous students of the genus, who have sent me living plants and herbarium specimens, and have seemed to spare no pains to guide me to stations of special interest.

The result of these observations is to confirm in every particular the inferences of my previous article, and, furthermore, to bring to light some twenty-five additional hybrids and crosses in the genus *Viola*. In short, as regards at least the blue acaulescent violets of northeastern America the general rule seems to be inductively established, that *of the currently recognized species any two, that have been growing together for several years, are likely to present hybrids.*

Before entering upon the details of this evidence, certain preliminary matters should be presented, as helpful to a better understanding of the problem.

HYBRIDISM AMONG EUROPEAN VIOLETS.

It is interesting to note that in recent years a similar tendency to interbreed has been recognized in the European species of *Viola*. In the last edition of Garcke's *Flora of Germany* eighteen violet hybrids are reported as having been found among their twenty species. In a list of the plants of Norway and Sweden published in 1900 twenty-two violet hybrids are enumerated among their twenty-seven species. In a recent number of the *Botanische Zeitschrift* Dr. Heinrich Sabransky gives a list of ten species and nine hybrids that he has found in a

¹ RHODORA, vi. 213-223, Nov., 1904.

somewhat limited district of Austria, and remarks on the "most extraordinary tendency of the forms to hybridize; in no other genus does there appear such a multitude of hybrids as among the violets." Our blue stemless violets are all distinct from those of Europe, but the disposition to hybridize seems to manifest itself in all groups of the genus, and on both Continents.

LAWS RELATING TO KNOWN HYBRIDS AMONG FLOWERING PLANTS.

To appreciate the evidence that certain forms of *Viola* are hybrids, one should have some definite knowledge of the usual behavior of known hybrids in other genera. This is well set forth in Focke's great work,¹ which contains a compendious account of the two or three thousand artificial and natural hybrids known at the time of publication, and discusses the general laws governing this group of phenomena. In regard to hybrids between *nearly related* but *distinct* species their behavior as a rule may be stated as follows:—

1. The hybrids have characters that are intermediate between the unlike characters of the parent forms.
2. They and their offspring are stable; that is, the several individuals resemble each other as closely as those that result from normal sexual reproduction.
3. They are more or less infertile, usually from defective pollen.
4. They are unusually vigorous in their vegetative functions; their flowers also are larger and remain longer in bloom.

These four laws precisely describe the behavior of the hybrids between any two *well-marked* species of our blue stemless violets. If one parent is pubescent and the other glabrous, the hybrid will be somewhat pubescent; if the cleistogamous peduncle in one is long and erect, and in the other short and deflexed, it will be of medium length and ascending in the hybrid; if the cleistogamous capsule is green in one parent and purple in the other, it will as a rule be green but more or less flecked with purple in the hybrid. Furthermore, the hybrids and their progeny are fairly constant. Thirty seedlings

¹ Die Pflanzen-Mischlinge von W. O. Focke, Berlin, 1881. Octavo, 570 pages; no English translation.

of *V. affinis* × *septentrionalis* have been under cultivation since July, 1904, and they all look just alike. About twenty plants of *V. cucullata* × *fimbriatula*, from three different States show no appreciable difference. Also the infertility of these hybrids is most noticeable; rarely are more than 30 per cent of the ovules fertilized, usually about 10 per cent, occasionally none. Focke¹ has noted the marked infertility of the European hybrids of *Viola*. Lastly, the rank growth of violet hybrids is most pronounced. In many cases I have the hybrid growing side by side with the parent species, and always the robustness of the hybrid is strikingly apparent. I have frequently made eight or ten ample specimens out of one plant. On one individual of *V. affinis* × *sororia* I counted last May 148 large petaliferous flowers.

But when crosses are made between *doubtfully distinct* species, or between races, or between a species and its variety, there is commonly a marked departure from the first three of the laws above stated, viz.—

1. The offspring of such crosses have not intermediate characters, but various recombinations of the unlike characters of the parent forms.
2. The individual plants are consequently often dissimilar, some reverting to one or the other of the parent forms, others presenting all sorts of compromises,—a phenomenon known to breeders as “sporting.”
3. There is no impairment of fertility either in the first or in subsequent generations.

To this class belong the so-called Mendelian hybrids,—the despair of the systematist, but the vantage ground of the breeder of new and useful “varieties.”

The latest discussion of this subject is to be found in the recently published volume of DeVries. This author makes a sharp distinction between a specific and a varietal character. The latter he regards as but the loss or latency of a quality, which is positive and dominant in the typical form of the species. When interbreeding takes place, he holds that specific characters are affected according to the first set of rules above cited; but varietal characters according to the second set. I can make but the briefest allusion to this novel explanation of the phenomena of hybridism, and my excuse for so doing is that it seems to find illustration in the behavior of certain crosses between

¹ L. c., p. 477.

closely allied forms of *Viola*. DeVries holds that ordinary species "differ from each other partly in specific, partly in varietal characters. As to the first, they give in their hybrids stable peculiarities, while as to the latter, they split up according to Mendel's law."¹ This, as I hope to show, is exactly what takes place, when two such species as *V. fimbriatula* and *V. sagittata* interbreed. Dr. Sabransky also observes that in Austria "among the stemless violets, hybrids present for the most part a more or less distinctly intermediate character; while among the stemmed violets, they present an unbroken series of transitional forms between the parents, whose characters thus become confluent."²

ARE SPECIFIC DISTINCTIONS ENDANGERED BY HYBRIDISM?

Some systematists seem disturbed at the discovery that certain groups of nearly related species freely interbreed. It seems to admit, as one of our keenest observers has expressed it, the existence of "a mutually destructive influence, breaking down the individual characters of species, and merging them finally into one." Surely, hybridism is a movement in this direction. But we must remember that the advance of living organisms proceeds through the conflict of two opposing forces, the one leading to multiform variation, the other seeking to conserve the type by requiring double parentage. Thus the aberrant traits that may arise in an individual by mutation or fluctuation, are usually eliminated in succeeding generations by the repeated process of pairing with normal individuals. This conflict ordinarily ceases with the pronounced establishment of separate species; but within several groups of *Viola*, consisting of forms but recently ranked as species, the conflict seems to be exceptionally prolonged.

But we may, I fancy, discover the cause of this exceptional behavior. The power of sexual reproduction to maintain uniformity in a group of plants is so great, that for the evolution of two or more species out of one the incipient species need in some way to be isolated from each other. Darwin describes the fauna and flora of certain oceanic

¹ "Species and Varieties, their Origin by Mutation," p. 307.

² Translated from "Allgemeine Botanische Zeitschrift," xi. 162, Oct., 1905.

islands as consisting of species distinct from but allied to those of the neighboring mainland; free intercourse over a connecting isthmus would have largely prevented this divergence into two sets of species.¹ In many genera we know that certain species remain distinct only because each has its separate range; if through the agency of man they are brought together, they become more or less confluent through interbreeding.—Some years since I was interested in the study of *Aquilegia*; I got together as many species as possible of both the Old World and the New, and became quite familiar with the various types. Afterward, when they had been growing for several years without cultivation on the north side of an arbor-vitae hedge, my attention was attracted by the appearance of forms that I had never seen before. I found that at least five different hybrids had appeared spontaneously. Similar instances are by no means rare.

An analogous cause has disturbed the relations to each other of our species of common blue violets. Two or three centuries ago the north-eastern United States was entirely covered with forests. The clearing away of these forests by man has profoundly modified the conditions of plant life. With the exception of *V. palmata*, our blue stemless violets are rarely found, and certainly do not thrive, in the primeval forest; they are rather plants of open groves, of fence-rows, and moist meadows. When the whole country was densely wooded, their growth must have been greatly restricted; but when the trees were removed they had a chance to 'run and be glorified'; their range was vastly extended; the number of individuals increased perhaps a thousand-fold; species before isolated became cohabitant, and had opportunities to hybridize.²

How far this movement of involution will extend, it is idle to speculate. But so far as regards the survival of our species of *Viola* we need give ourselves no concern; for the vast majority of its seeds are produced from the self-fertilized flowers, and must therefore be free from admixture with other species. However readily the petaliferous flowers may produce hybrids, these hybrids must always be greatly outnumbered by the legitimate offspring.

MIDDLEBURY COLLEGE.

¹ The Origin of Species, 6th ed., ii. 177–182.

² It would be interesting to follow out this line of thought in its bearing on other groups of species, such as *Crataegus* and *Rubus*. There are not wanting grounds for the suspicion that they too, since the forests were cleared, have enormously multiplied, and have been behaving badly,—producing hybrids and Mendelian crosses,—sporting wantonly,—at the expense of the makers of species.

A NEW GEUM FROM VERMONT AND QUEBEC.

M. L. FERNALD.

IN June, 1898, Mr. W. W. Eggleston collected at Mendon, Vermont, a *Geum* which he sent without name to the Gray Herbarium. The specimen was in anthesis, and without detailed examination was passed as *Geum macrophyllum* Willd.

On July 6 last, however, a *Geum* quite like Mr. Eggleston's Mendon plant was found by Messrs. E. F. Williams, J. F. Collins and the writer in a boggy meadow by the St. Lawrence at Bic in the County of Rimouski, Quebec. At Bic the plant which was nearly past anthesis attracted immediate attention by its large wide-spreading crimson calyx, deep claret-colored styles, and the strongly contrasting broadly obcordate bright yellow petals; and only in the outline of the leaf did it suggest the common *Geum macrophyllum* of the lower St. Lawrence and northern New England. That well-known plant abounds at Bic and a superficial examination was sufficient to show that, in its small green recurved calyx, its greenish or barely crimson-tinged styles, and its small narrow pale petals, it had little in common with the plant now seen growing for the first time.

Detailed study of the new plant shows that its only immediate allies in America are *Geum rivale* L. and *G. geniculatum* Michx., while in many characters it is nearer the Scandinavian species, *G. hispidum* Fries and *G. intermedium* Ehrh. To none of these species does the plant of Bic and Mendon seem to be referable, and it has been impossible to find any plant to which it is more closely allied. It is apparently a somewhat local representative of Seringe's section *Cariophyllata*, which may be sought with confidence elsewhere in New England and eastern Canada, and which on account of the effective contrast of colors in its flowers may be called

GEUM pulchrum sp. n. Caule erecto piloso-hispido apice glanduloso-puberulo 4-11-floro; foliis radicalibus interrupte pinnatisectis subtus hispidis lobis obovatis dentatis, foliis caulinis trilobis lobis obovatis; stipulis anguste ovatis argute serratis; pedunculis purpurascenscentibus tenuibus; floribus nutantibus; calyce purpurascenscente, laciniis patentibus deltoideo-ovatis; petalis suborbicularibus obcordatis flavis; filamentis badiis vel purpurascenscentibus; carpellis setosis, stylis elongatis valde purpureis geniculatis, appendicibus plumosis coccineis.

Stem 4-9 dm. high, erect, rather slender, somewhat pilose-hispid throughout, glandular-puberulent above, 4-11-flowered: basal leaves interruptedly pinnate, 1.5-3.5 dm. long, hispid below; the 3 approximate obovate terminal lobes shallowly lobed and coarsely dentate, the uppermost largest (5-9 cm. long, 4-8 cm. broad), with 4 to 6 unequal pairs of subopposite or scattered ovate lobes (0.5-4 cm. long) below; cauline 3-lobed or -parted, the lower short-petioled, the upper sessile, the leaflets obovate (or the uppermost lanceolate) sharply toothed, mostly 3-5.5 cm. long: stipules narrowly ovate sharply and coarsely toothed, 1-2 cm. long: peduncles purplish, slender, at first nodding, later becoming erect: calyx purplish, in anthesis 1-1.3 cm. broad, becoming larger in fruit, cleft half-way to base into deltoid-ovate acuminate strigose wide-spreading lobes, with linear-subulate alternating teeth (1 mm. long): petals 7 or 8 mm. long, bright yellow, suborbicular, obcordate, narrowed to short claws: filaments yellowish or purplish: carpels bristly below with ascending yellow-white hairs; the elongate deep-purple styles jointed above the middle, the upper plumose portion carmine: fruit not seen.—QUEBEC, boggy meadow by the St. Lawrence, Bic, July 6, 1905 (*Williams, Collins, & Fernald*): VERMONT, Mendon, July 16, 1898 (*W. W. Eggleston*).

GRAY HERBARIUM. *June*

A HYBRID ASPLENIUM NEW TO THE FLORA OF VERMONT.

GEORGE E. DAVENPORT.

THE finding of a hybrid *Asplenium* at Proctor, Vermont, by Mr. G. A. Woolson of Pittsford Mills, is of more than ordinary interest, both on account of the accurately noted environment and because the fern although previously known as a European plant has never before been recorded in America. It is the *Asplenium Trichomanes* × *Ruta-muraria* of Ascherson & Graebner¹ of which several somewhat varying forms have been contrasted in parallel columns by Christ.² Mr. Woolson's account of his discovery gives the following details.

Passing over a ridge at Proctor, Vermont, he paused in an open space to see what was growing on and between the outcropping

¹ Synopsis der Mitteleuropäischen Flora, i. 79 (1896).

² Die Farnkräuter der Schweiz, 97, f. 15 (1900).

rocks. Here his attention was attracted by a clump of ferns with pinnae which appeared abnormal and he took specimens together with others of *Asplenium Ruta-muraria*, which were growing three feet from the clump in question. On closer inspection later Mr. Woolson suspected that the anomalous fern was the result of a cross between *A. Ruta-muraria* and *A. Trichomanes* and returning to the spot he "went on hands and knees" over practically all the neighboring ground in search of the other parent plant. The only species growing in abundance was *A. Ruta-muraria*, much of it young; but a few fruited plants were found not over a foot from the particular clump in question. About eighteen feet away there was some *Pellaea atropurpurea*, with a "touch of *Camptosorus* and *A. ebeneum*" but no *A. Trichomanes* in sight although the habitat appeared just right for that species. However, on following a dip in the ridge over another rise and down over the edge of a steep bank facing the north, Mr. Woolson found an abundance of *A. Trichomanes*, as well as a second lot under the shelving edge of a ridge a little more to the east. Either place was fully a hundred and twenty-five feet from the rock bearing the hybrid fern.

While admitting that the peculiar fern looks much like a hybrid between *A. Trichomanes* and *A. Ruta-muraria*, Mr. Woolson expresses doubt as to the power of the wind as a possible agency in transporting the spores of *A. Trichomanes* to such a distance and over such barriers.

But we know that the wind is capable of doing most extraordinary things, and it is always the unexpected that happens. So many instances of this have occurred in my own experience that I have long ago ceased to wonder at anything of the kind being brought about through the agency of the wind, and the fact of fern spores being swirled about and distributed into all manner of seemingly inaccessible places is not so great a source of wonderment to me as the facts of hybridization itself.

Ferns are constantly intermingling in vast numbers under conditions most favorable for interbreeding and producing a great diversity of variant forms, yet these forms are for the greater part readily referable to one or the other of well established genera and species. Seldom indeed do we find any that can be considered for an absolute certainty as hybrid combinations; such, however, seems to be the case in the present instance beyond any reasonable doubt, and the apparent

difficulty of wind-blown spores having reached the seemingly inaccessible niche where this hybrid fern was found was no greater than in some other instances of spore migrations previously recorded by me.

When first received the dual characters and resemblance of the newcomer to *A. Trichomanes* and *A. viride* impressed me with the possibility of its being a hybrid between those two species, but the absence of the latter from that section altogether led me to treat it provisionally as a form of *A. Trichomanes*. The later and fuller information subsequently received, however, led to a further investigation that enabled me to identify it properly through an admirable figure published by Dr. Christ (l. c.) of a somewhat larger form from Lugano.

Three forms of this hybrid, to which specific names had been given, were brought together under the present combination by Ascherson and Graebner in the work already cited, and these are arranged by Dr. Christ under comparative descriptions with his own account of the large form from Lugano.

The following brief diagnosis will, I think, sufficiently indicate the general characters of our Vermont plant. Sporophyte small with the habit of *A. Trichomanes*. Fronds 6 to 10 cm. long, elongate, lanceolate, broadest at base; stipe and lamina of nearly equal length, stipe and lower half of rachis brownish black as in *A. Trichomanes*, then green above as in *A. viride* (the young growing fronds wholly green), wingless; lamina pinnate with 7 to 8 pair of short-stalked pinnae, and an enlarged terminal one with shallow lobes on one or both sides, those below, to about the middle of the lamina, entire, the uppermost obovate, the lower ones broadening and becoming roundish ovate with cuneate bases, below the middle increasing abruptly in size, more or less lobed with rounded lobes, the second pair deeply lobed or 3-parted, the lowermost pair fully 3-parted with the upper basal lobe quite distinct. Margins crenulately denticulate. Sori short, becoming confluent and covering the lobes at maturity. Indusium irregularly denticulate. Proctor, Vermont, August 29, 1905, *G. A. Woolson*.

The essential characters of the parent plants are reproduced in their offspring as follows:—

1st. *TRICHOMANES* characters are seen in the brownish-black stipe the lower portion of rachis, and partially also in the shape of the upper pinnae.

2nd. *RUTA-MURARIA* characters are seen in the long stipes and

green upper portion of the rachis, the distant pinnae, and more especially in the 3 parted lower pinnae.¹

The dimensions of our plant fairly approximate those given by Ascherson and Graebner (l. c.), but the Lugano form described by Dr. Christ exceeds those dimensions by about one third, the fronds reaching a length of 15 cm. as seen in the fine figure published by that author.

Our plant, however, differs from the European forms already published in having the lower pinnae more deeply lobed or even divided, and this inclined me at first to treat it as a distinct form, but in view of the well known disposition on the part of hybrids to produce all manner of deviations, and the existence of certain other deviations in the European forms, it has seemed best to regard all such deviations as of minor importance and to recognize only the one combination.

Mr. Woolson is to be congratulated on his interesting discovery, which adds new evidence of the unity of the American and European fern floras. It should also be a spur to fern-students and encourage them to search carefully for other fern treasures that lie hidden awaiting only the advent of some keen eyed observer to bring them out into the light.

MEDFORD, MASSACHUSETTS.

SPIRANTHES OVALIS.

OAKES AMES.

IN 1840, Dr. John Lindley published the description of a new species of *Spiranthes* collected by Drummond in Texas and in allusion to the oval form of the inflorescence called it *S. ovalis*. From that time on the specific name was not taken up by American botanists and at present is not applied to any American species in our botanical publications. The explanation of this is perhaps simple, as *S. ovalis* is one of the rarest of the *Spiranthes* species which are natives of the United States, and as the description in Lindley's *Genera and Species of Orchidaceous Plants* is a wholly inadequate characterization.

¹A print from one of Mr. Woolson's specimens since seen, shows at least one of the lower pinnae not only with three distinct lobes, but with the outer lobe becoming again slightly 3-lobed.

When A. W. Chapman prepared the third edition of his *Flora of the Southern United States* he described a new variety of *Spiranthes cernua*, Rich., and named it var. *parviflora*. The type was collected in rich oak woods near Rome, Georgia. Later, Dr. Small, as shown by his *Flora of the Southeastern United States*, recognized that Chapman had strained affinities in making the Georgian plant a variety of *S. cernua*, and he, therefore, raised it to specific rank under *Gyrostachys*. In my treatise on the American Species of *Spiranthes*, published in Fascicle I of *Orchidaceae*, I placed this species, doubtfully, next to *S. Romanzoffiana* on account of the constriction of the lip in several specimens examined. Last November at Kew a comparison of *Spiranthes parviflora* with *Spiranthes ovalis* Lindl. proved that they were conspecific. The type comprises three individuals preserved in the Hookerian Herbarium.

Spiranthes ovalis is of special interest as it is not confined to the states of the extreme south and as the northern limits of its distribution bring it within the area covered by Gray's Manual. According to studies of the material in the principal herbaria of America and England it is most common in Missouri, where George Engelmann collected specimens as early as 1835, and where as recently as September, 1905, it was found by B. F. Bush (no. 3322). How such a distinct species has been omitted from our manuals devoted to the botany of the northern United States is difficult to explain. It is very similar in aspect to *Spiranthes latifolia*, Torr., and might easily be mistaken for it, but *S. latifolia* is a summer bloomer, while *S. ovalis* does not bloom until the fall of the year, even in the southern states, a fact which should have led to careful investigations. Furthermore, the flowers of the two species are quite different, and the scape of *S. ovalis* is much taller in relation to the leaves than the scape of *S. latifolia*.

SPIRANTHES OVALIS Lindley, Orch. Pl. 466 (1840).—*S. cernua*, var. *parviflora*, Cham., Fl. S. U. S. ed. 3, 488 (1897).—*Gyrostachys parviflora*, Small, Fl. Se. U. S. 318 (1903).—*Spiranthes parviflora*, Ames, *Orchidaceae*, Fasc. 1, 137 (1905). Lip ovate, 4–5 mm. long, sometimes constricted above the middle, few nerved, membranaceous; nipples slender, elongated, strongly curved. Distribution: Georgia, westward to Indian Territory; Tennessee and northward to Missouri and Illinois. In shady moist woods and on high wooded hills, September and October.

NORTH EASTON, MASSACHUSETTS.

A NEW RUBUS FROM CONNECTICUT.

W. H. BLANCHARD.

Rubus Andrewsianus, n. sp. Plants pubescent with frequently a few stalked glands on the inflorescence and remarkably long, stout and numerous prickles. Inflorescence ending leafy branches.

New canes. Stems erect or recurving but never reaching the ground, 3 to 5 feet high, stout, often $\frac{3}{8}$ in. in diameter, reddish on the upper side; branched in rich open places, glabrous, strongly 5-angled and furrowed. Prickles $\frac{1}{4}$ of an inch long, 7 to 15 to the inch, straight, perpendicular to the stem and on its angles only. Leaves of moderate size, 8 in. long and 7 in. wide, 5-foliate, dark yellow-green above with numerous appressed hairs, lighter below and velvety to the touch with abundant appressed pubescence. Leaflets oval, the middle one sometimes slightly cordate; outline entire, finely and doubly serrate-dentate, short taper-pointed, the upper ones rounded at the base, the basal ones cuneate, rather thick, about twice as long as wide, the middle one slightly wider. Petiole and petiolules grooved, stout, glandles, covered with long soft pubescence and numerous strong hooked prickles in three rows continued in one row on the midrib; the petiolule of the middle leaflet about an inch long, those of the side leaflets about one-third as long, and the basal ones sessile.

Old canes. Erect, not pulled down by snow or weight of foliage or fruit, prickles intact. Second year's growth entirely of leafy branches generally one from each old leaf axil, somewhat zigzag, tipped with the inflorescence. Branch stems terete, slightly pubescent, prickles straight, slanting backward. Terminal branches 4 to 6 in. long with leaves mostly 3-foliate, some unifoliate, and ending in a short raceme pubescent with frequently a few stalked glands intermixed, quite regular, an inch long with 8 to 12 flowers on slender pedicels an inch long or less set at a great angle to their axis. Bracts small, never leafy-bracted. Lower branches often 20 inches long, the numerous leaves mostly 3-foliate occasionally 5-foliate, inflorescence scanty or wanting. Intermediate branches increasing regularly in length downwards and the amount of inflorescence on their tips as regularly decreasing. Leaflets oval or ovate, generally rounded at the base, pointed, the middle one stalked; outline

entire, pubescence, color and serration as in those of the new canes, prickles smaller. Flowers showy, 1 to $1\frac{1}{2}$ in. broad, petals two-thirds as wide as long, abruptly narrowed into a rather long claw. Fruit normally short cylindric, sepals not conspicuously reflexed, drupelets large and black; a typical good fruit being $\frac{1}{2}$ in. high and $\frac{9}{16}$ in. wide with 30 drupelets $\frac{3}{16}$ in. in diameter. Not very productive. Flowers about June 15, the fruit ripe Aug. 15. An abnormal form with yellow crumpled leaves, blasted fruit and long sepals frequent in this species and not unknown in some others.

Type station "Lazy-lane," Southington, Conn. Ranges from Southwick, Mass., and Old Lyme, Conn., to Bedford Park, N. Y. City. Probably widely distributed. Open places in dry ground.

This stalwart plant I first found in Southwick, Mass., in August, 1903, near the depot. Journeying on foot I found it all the way to Southington, Conn. Mr. C. H. Bissell and Mr. Luman Andrews had it in their herbaria. In July, 1904, I collected it in Southington and Bristol and also in June and August, 1905. In June, 1905, I collected a plant in Bedford Park, New York City, which differs slightly from this having even longer prickles, middle leaflet on new canes ovate, and more quinate leaves on the old canes. It was common there. A specimen in the Gray Herbarium, numbered 116, collected by Dr. C. B. Graves June 12, 1900, at Old Lyme, Conn., is evidently this species as well as no. 288, one of the abnormal forms mentioned, collected by him at the same place Aug. 18, 1902.

It is with pleasure that I associate with this fine plant the name of Mr. Luman Andrews an enthusiastic and tireless collector and joint author with Mr. C. H. Bissell of the "Flora of Southington, Conn."

This blackberry can be readily distinguished at a glance by its formidable prickles and leafy branches tipped with flowers or fruit. It is not probable that any of the cultivated forms have sprung from this species.

WESTMINSTER, VERMONT.

OBSERVATIONS UPON *POGONIA* (ISOTRIA)
VERTICILLATA.

(Plate 65).

HOMER DOLIVER HOUSE.

A large colony of the rare orchid *Pogonia verticillata* (Willd.) Nutt. was recently observed near Washington, D. C., by Mr. Joseph H. Painter of the National Museum, and the writer. It was discovered that many if not all of the plants were connected in groups of two to four or more plants by perennial horizontal rhizomes, one to six feet in length. In the accompanying photograph (plate 65) a small group is shown, consisting of two mature flowering plants and a young plant without a flower, connected by a single root-system, the entire extent of which measured about three feet. There is also shown a single plant with two flowering stems.

Inquiry revealed the fact that the nature of the roots of this orchid is almost unknown, even to many of those familiar with it growing. In systematic literature we find the following scanty or misleading descriptions of the root of *Pogonia*:—Beck, "perennial"; Darlington, "root of fleshy fibers"; A. Gray, "root a cluster of fibers"; Britton's Maunal, "rootstock and fibrous roots,—stems from long fleshy roots." Rafinesque, Eaton and Wood, do not mention the root. Recently, J. G. Hall (RHODORA 7: 49. M. 1905) mentions having seen roots of this species "18 to 20 feet long."

The perennial rhizome of *Pogonia verticillata* is horizontal and gives rise to new stems by buds which when partially developed give off fibrous roots, just above the origin of the new stem, similar in all respects to the somewhat fleshy, brittle rootstocks. These roots,



usually three to nine to a stem, vary greatly in length, some of them becoming rootstocks by the budding of new stems. Seedling plants must therefore develop this system of root-fibers before new plants can arise by budding. Seedlings are, however, very scarce and fully 90 per cent of the plants in any single, well developed colony arise by the budding process from the rootstocks. In age the rootstocks become very brittle and the older connections are easily destroyed and apparently in many cases perish from decay so that while it is common to find a colony a hundred feet in diameter, it is extremely rare to find a single system more than a few feet in extent, owing no doubt to the perishing of the connecting rootstocks after a few seasons. The individual plants once established are perennial, and flower several seasons at least, as is shown by the withered stems of former seasons, frequently found persisting and shown in plate 65.

The habitat of this species is usually given as "low woods," a statement which although not absolutely wrong needs some qualification. The species seems to prefer a moist, soft, rich and well divided leaf-mould and under these conditions is often found on comparatively dry hills, always under some shade, usually of deciduous trees but often evergreens and preferably on a slope with a northern or eastern exposure.

In some localities (observed in Central New York by the writer) it is found growing in sphagnum and the rhizomes under this condition attain a much greater length than in soil.

The coloring of the floral organs seems to have obtained scanty mention, perhaps from the fact that the plants usually turn black in drying. The two lateral lobes of the lip as well as the lateral margins are tinged and veined with a bright crimson-purple, most vivid at the apex of the lobes, while the broad, crenulate, deflexed middle lobe is pure white. The crest of the lip is green and papillose. The two upper petals are light green and arching above the lip nearly conceal it although the lip and petals spread somewhat apart in age. The filiform sepals are dull reddish-purple.

The whorl of lanceolate leaves is rarely fully developed or even expanded at flowering time as is usually shown in illustrations. The stem of *Medeola* with which this *Pogonia* often grows associated is green and glabrous, while that of *Pogonia* is purplish and covered with a whitish tomentum, affording a ready means of distinguishing between the two at a glance.

CLEMSON COLLEGE, SOUTH CAROLINA.

A HANDSOME WILLOW OF THE PENOBSCOT VALLEY.

M. L. FERNALD.

THE large shrub which in the Penobscot Valley is usually supposed to be *Salix sericea* Marsh. has the young leaves conspicuously reddish-white beneath with long appressed lustrous and somewhat tangled felt-like pubescence; the mature leaves 6–12 cm. long, 2–3.5 cm. broad, velvety beneath with distinct subappressed hairs, and conspicuously serrate-dentate with salient gland-tipped teeth. The semi-ovate very glanduliferous stipules are small (4–5 mm. long) and persistent; and the slender pistillate aments are, in anthesis 2–3.5 cm. long, in fruit 4–5.5 cm. long, and borne on distinctly elongating lateral leafy branchlets.

Recently one of my students, Mr. William G. Vinal, has called my attention to certain peculiarities which distinguish the Penobscot Valley shrub from the more southern *Salix sericea*, and an examination of the material shows that in very many characteristics the two shrubs are distinct. *S. sericea*, which occurs from southern Maine to North Carolina and west to the Great Lakes and the Mississippi Basin, has the leaves silky beneath with minute close hairs, in maturity 4–10 cm. long, 1–2.5 cm. broad, closely glandular-serrulate with fine teeth. The stipules, which are rarely developed, are lanceolate, 2–3 mm. long, and caducous, usually quite absent from the mature branches; and the pistillate aments, borne on very short slightly bracteate peduncles or subsessile upon the old wood, rarely become in fruit more than 2–3 cm. long.

Besides these superficial characters which separate the two shrubs, an examination of the pistillate aments shows other characters which indicate that the shrub of the Penobscot Valley is specifically distinct from *Salix sericea*. The latter species has the style minute or quite wanting, the sericeous oblong round-tipped capsule raised on a pedicel which about equals the short-hairy scale and about twice exceeds the gland. In the shrub of central Maine the style is definite; and the looser-hairy conical capsule, though pedicelled, is nearly equalled by the very long hairs of the scale; and the gland is very minute.

The shrub of central Maine is in the shape of its capsule and its distinct style as closely related to the arctic-alpine *Salix argyrocarpa*

Anders. as to *S. sericea*. That species, however, has a finer pubescence, paler scales, smaller aments and capsules, and small entire revolute leaves without stipules.

Differing, then, in essentially all characters from the more southern *Salix sericea* with which it has been confused and the arctic-alpine *S. argyrocarpa* to which it is as closely related, the shrub of the Penobscot Valley seems worthy specific separation from those species, and it is here proposed as

Salix coactilis, sp. n. Frutex altus, ramis crassis subquadratis fusco-viridibus vel atris junioribus griseis puberulis; foliis oblongis vel lanceolato-ovatis longe acuminatis junioribus subtus dense pubescentibus, pilis rufo-albidis fulgidis coactilibus, demum subtus velutinis supra viridibus 6-12 cm. longis 2-3.5 cm. latis remote et argute glanduloso-dentatis, petiolis gracilibus 1-1.5 cm. longis griseo-velutinis; stipulis semi-ovatis glanduloso-serratis 4-5 mm. longis persistentibus; amentis foliato-pedunculatis cylindricis 2-3.5 cm. longis, fructiferis 4-5.5 cm. longis 7 mm. crassis; squamis oblongis vel obovatis apice obtusis vel rotundatis fuscis vel nigrescentibus longe pilosis, pilis laminam aequantibus; capsulis conico-subulatis 5 mm. longis albidovillosis pedicellatis, pedicello nectarium quintuplo superante; stylo distincto 0.5 mm. longo, stigmatibus brevibus bilobatis.

Large shrub with coarse stiff branches; branchlets somewhat quadrangular, dark green or blackish, the youngest gray and puberulent: leaves oblong or lance-ovate long-acuminate, slender-petioled, at first reddish-white beneath with lustrous felt-like pubescence, afterward velutinous with distinct hairs, in maturity 6-12 cm. long, 2-3.5 cm. broad, remotely and coarsely glandular-dentate; stipules semi-ovate, gland-toothed, 4-5 mm. long, persistent: aments on short leafy peduncles, expanding with the leaves, in anthesis 2-3.5 cm. long, in fruit 4-5.5 cm. long, 7 mm. thick: scales oblong or obovate, blunt or rounded at tip, dark brown to blackish, very hairy; the hairs usually as long as the blade: capsule conic-subulate, 5 mm. long, white-villous, the pedicel 1-1.5 mm. long, about five times as long as the gland: style definite, 0.5 mm. long; stigmas short, 2-lobed. — MAINE, banks of Penobscot River, Orono, in anthesis May 29 and 30, 1890 (*M. L. Fernald*); Bangor, May 16 and June 7, 1904 (*O. W. Knight*, nos. 30 [TYPE] and 31).

GRAY HERBARIUM.

NEPHRODIUM FILIX-MAS IN VERMONT.—Miss Nancy Darling of Woodstock, has had the good fortune to find in the neighboring town

of Hartland, Vermont, a station for *Nephrodium Filix-mas*. It is a new fern not only for Vermont, but for New England; the nearest reported stations being at the eastern end of the Gaspé Peninsula, and the next nearest, in northern Michigan. In the Old World the plant is not uncommon, and for several centuries has been esteemed for certain medicinal properties. The specific name is that by which alone it was known before the binomial system of naming was adopted by Linnaeus,—“*Filix mas*,” the male-fern, being thus distinguished from “*Filix foemina*,” the lady-fern.

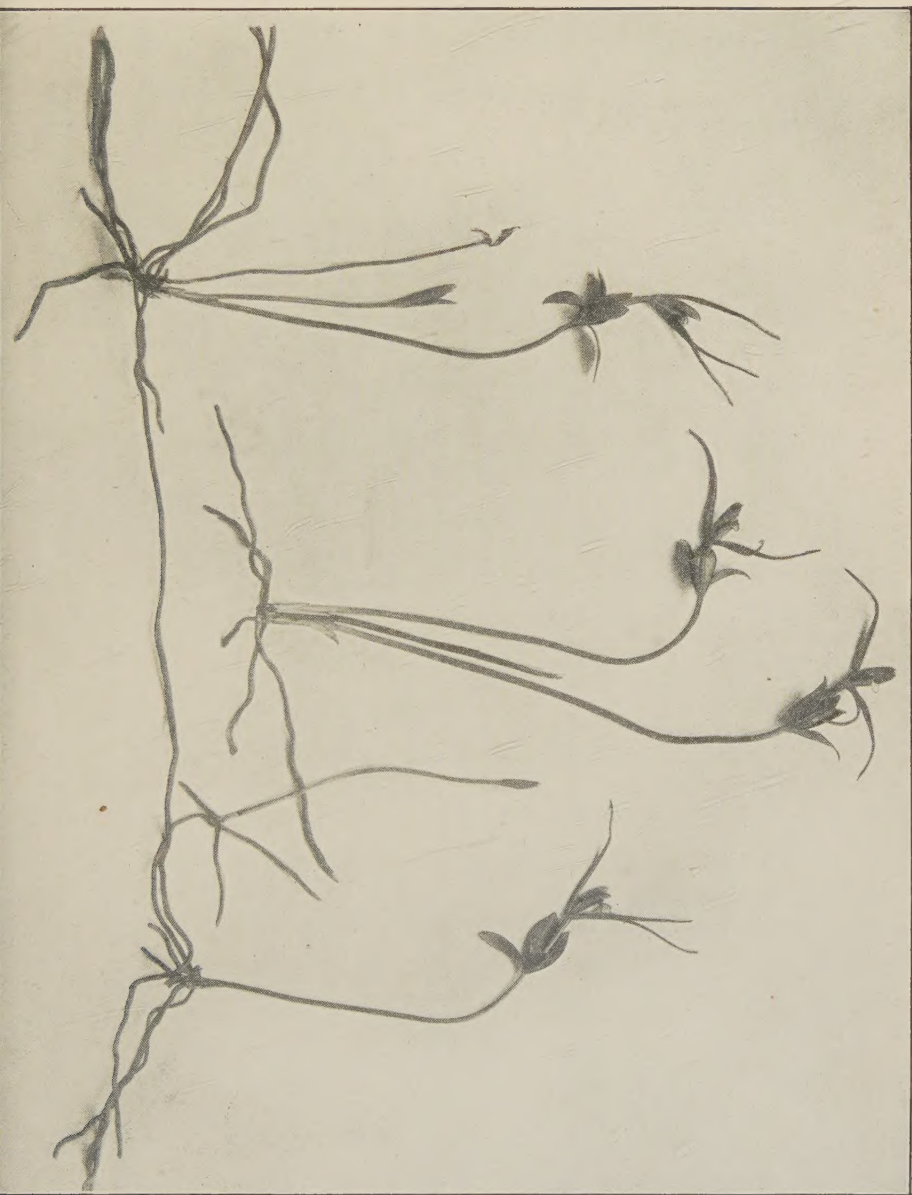
Miss Darling, at whose request this note is presented, reports that the Hartland station is some fourteen hundred feet above sea level, and nearly half a mile from any dwelling; so that the environment gives satisfactory evidence that the species is indigenous. The colony consisted of half a dozen plants in three small clumps; they were growing on rocky land, among paper birches.—EZRA BRAINERD, Middlebury, Vermont.

NOTES ON TWO SPECIES OF *SPOROBOLUS*.—I collected *Sporobolus asper*, Kunth, September 12, 1903, near New Haven, Connecticut. It was found on a steep, rocky slope, where it grew in scattered tufts over an area of several square rods, and amid a profusion of taller grasses, which nearly concealed even the largest tufts. On September 12, 1905, it was in full bloom, and in better condition for collection than on the corresponding date two years before, and it seemed to be more abundant. The Illustrated Flora gives Delaware as the northern limit of the species, and this station appears to be the first one reported from New England. Specimens from this station have been verified by Mr. A. S. Hitchcock at the Herbarium of the Bureau of Plant Industry in Washington. I collected *S. neglectus*, Nash, September 12, 1903, near the above locality for *S. asper*, upon a long narrow bench of rock, where the soil was thin and dry. It was abundant here. These specimens have also been verified by Mr. Hitchcock.—R. W. WOODWARD, New Haven, Connecticut.

THE VERMONT BOTANICAL CLUB held its 11th annual Winter Meeting at the University of Vermont, Burlington, January 17 and 18. Among the items of interest to students of plant distribution were the reports of the discovery of *Aspidium Filix-mas* at Harland by Miss

Nancy Darling, of *Oxalis violacea* at Dummerston by Miss A. L. Reed, and of *Rhododendron Rhodora* at Bradford by Miss A. E. Bacon. Dr. H. H. Swift showed a fine series of lantern slides from original photographs showing nearly every one of our native ferns. The officers were re-elected as follows—Pres., Ezra Brainerd, Vice Pres., C. G. Pringle, Treas., Mrs. N. F. Flynn, Secy., L. R. Jones (Burlington). It was decided to begin the publication of an annual bulletin containing a report of the winter meeting. The first number will appear in April probably. It was decided to hold the next summer meeting about the first week of July on Mt. Mansfield.—L. R. J.

Vol. 7, no. 84, including pages 245 to 286, plate 64, and title page of the volume, was issued 31 December, 1905.



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